

Memphis, Missouri
Water Supply Study
Lake Show Me and Memphis Old Lake

Memphis Missouri is located in Scotland County, in northeast Missouri.

Memphis water supply comes from the city owned "Lake Show Me" and an older lake. The lakes are located 2 miles southwest of Memphis in the North Fabius watershed.

Memphis Lake analysis consisted of using the NRCS's computer program called "RESOP". There are two lakes in series. Lake Show Me, the larger lake, is upstream of the old lake. The old lake is not currently being used for water supply. This analysis consisted of evaluating the lake system in series with the current water demand coming only from the new lake. Both lakes were also evaluated for their optimized yield.

In year 2000, Memphis used 153,276,495 gallons of water.

Following are considerations for data input to the "RESOP" program.

STO-AREA Elevation-Storage and Elevation-Area data were determined from June 19, 2001 survey made by USGS for the old lake and the new lake was surveyed on June 3, 2002.

Memphis Lake "Lake Show Me"			Memphis Old Lake		
Elevation (feet)	Area (acres)	Storage (ac-ft)	Elevation (feet)	Area (acres)	Storage (ac-ft)
728	1.91	1.01	706	0.81	0.58
730	6.38	9.16	708	2.26	3.65
732	11.70	27.13	710	8.42	12.48
734	17.30	55.95	712	19.94	40.68
736	23.22	96.36	714	27.81	89.59
738	30.40	149.42	715	30.09	118.59
740	38.47	218.33	716	32.04	149.63
742	46.46	303.00	718	40.49	219.51
744	57.07	406.47	720	50.12	309.39
746	68.04	531.36	721	57.50	364.87
748	79.01	678.14			
750	91.64	848.42			
752	104.93	1044.60			
754	119.12	1268.72			
756	133.85	1521.70			
758	149.19	1804.49			
760	165.59	2119.03			
762	181.47	2465.87			
764	198.60	2845.44			
766	214.18	3258.52			
768	228.70	3701.31			
769.8	244.93	4125.81			
770	246.53	4174.95			
772	262.08	4683.47			
774	278.41	5223.82			

Water Surface and Spillway
Elevation on 6/19/01 = 718.0
Top of Dam = 721.0

Water Surface and Spillway
Elevation on 6/3/02 = 769.8
Emergency Spillway Elevation 774.0

LIMITS Lake Show Me

Full Pool storage 4125.8 Ac.Ft.

Minimum Pool storage 50 Ac.Ft. at approximate elevation 734.

Old Lake

Full Pool storage 219.5 Ac.Ft.

Minimum Pool storage 10 Ac.Ft. at approximate elevation 710.

Starting storage was considered at full pool.

The drainage area of the upper lake is 2.66 square miles.

The drainage area of the lower lake is 1.51 square miles.

Total drainage area of the two lakes is 4.17 square miles.

GENERAL The adjustment factor of 0.76 to convert from pan evaporation to lake evaporation was applied prior to entering the data for the control word EVAP. As a result a factor of 100 is used.

The record period of drought is in the 1950's.

Analysis began in January 1951 and ended December 1959.

SEEPAGE

Lake Show Me

The reservoir seepage varied from 0 seepage near empty to a maximum of 2.0 inches per month at full pool. The seepage rate is a best estimate based on history of the reservoir, soil type, material of the core of the dam and compaction of the earth fill. The material in the dam is compacted earth of clayey soils.

When full the lake is about 40 feet deep, as a result the static pressure is fairly high and seepage is moderate.

Old Lake

The reservoir seepage varied from 0 seepage near empty to a maximum of 1.25 inch per month when at full pool. The material in the dam earth of clayey soils. This is an old dam and soil compaction is not as good as the Lake Show Me.

RAINFALL Rainfall data came from the Memphis, Mo. rain gage.

RUNOFF This is the runoff into the lake from its drainage area. Monthly runoff volumes in watershed inches were determined at the Middle Fabious stream gage, near Baring. The Gage is located approximately 8 miles south of Memphis.

EVAP. Pan evaporation at the Lakeside gaging station was used as a base because it has data for year around evaporation. All other stations only measure data between April through November. Lakeside data was updated during these months with gage data from stations at Spickard, New Franklin, and Columbia. Depending on the latest data for the station nearest to Memphis.

DEMAND Year 2000 records show the daily usage at 0.4199 Million Gallons per Day.

OTHER Because there is no other inflow to the lake this control word was not used.

Memphis, Missouri

Water Supply Study

Lake Show Me

Storage Volume

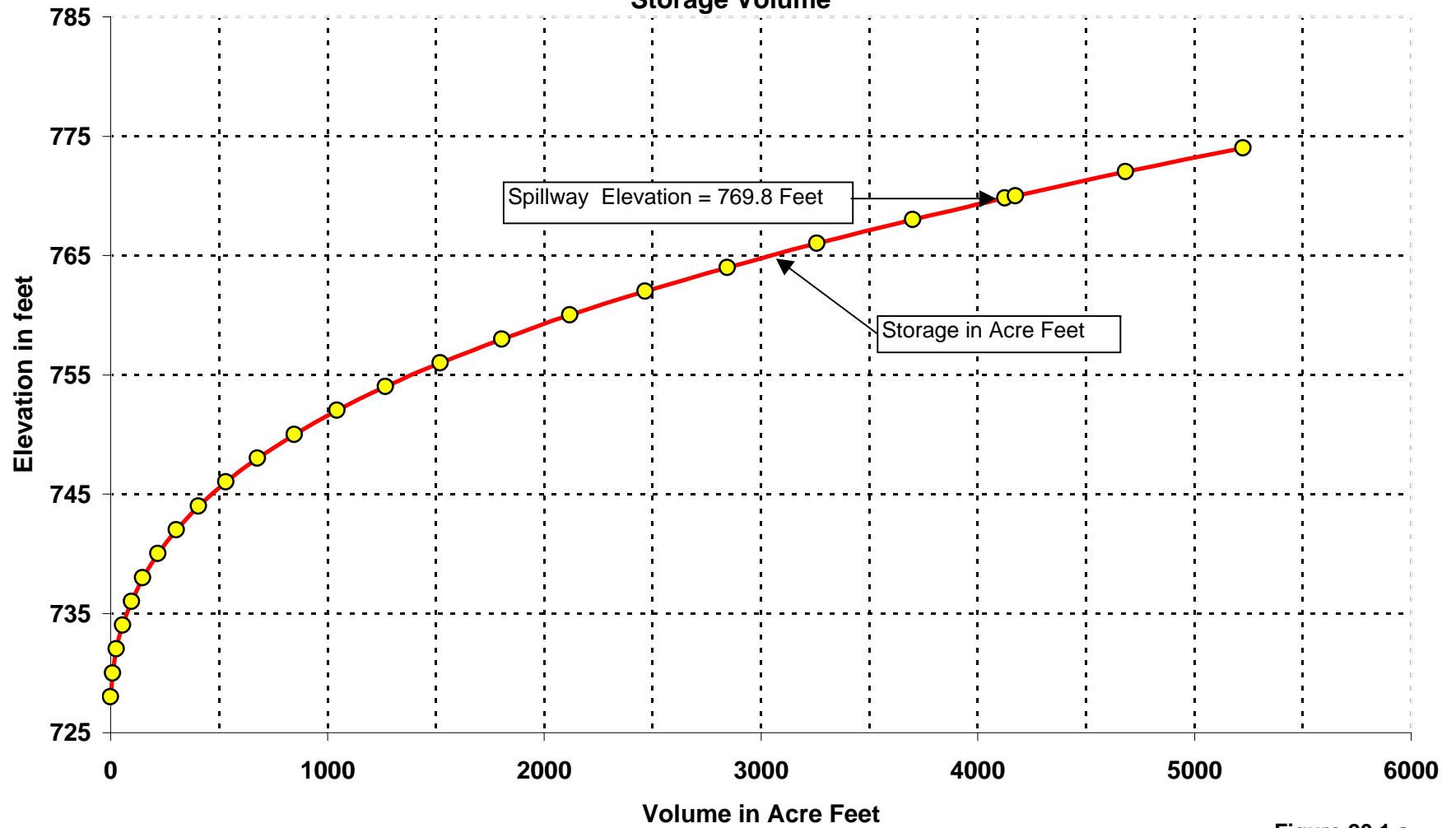


Figure 20.1.a

Memphis, Missouri

Water Supply Study

Lake Show Me

Surface Area

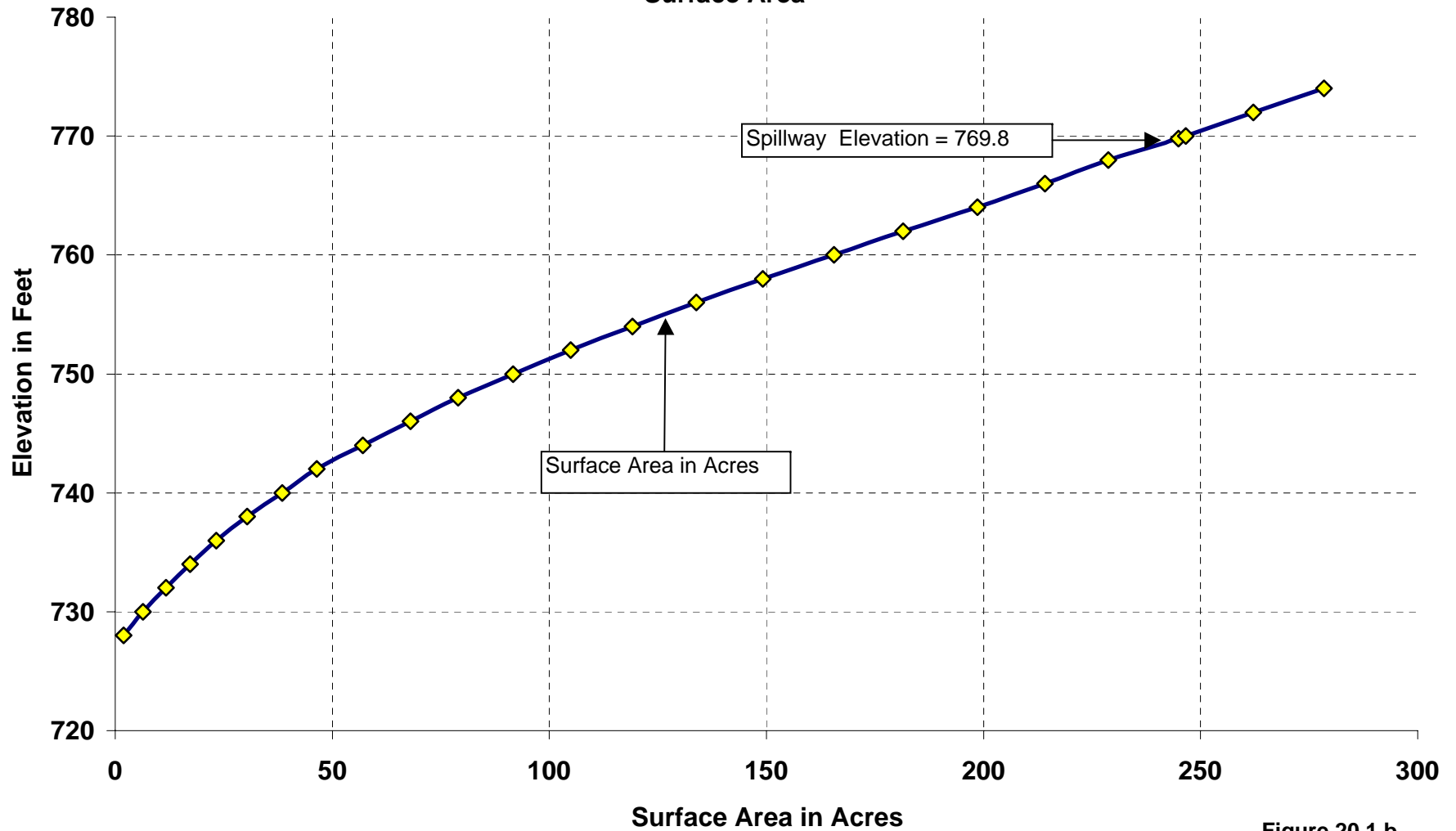


Figure 20.1.b

Memphis, Missouri

Water Supply Study

Old City Lake

Storage Volume

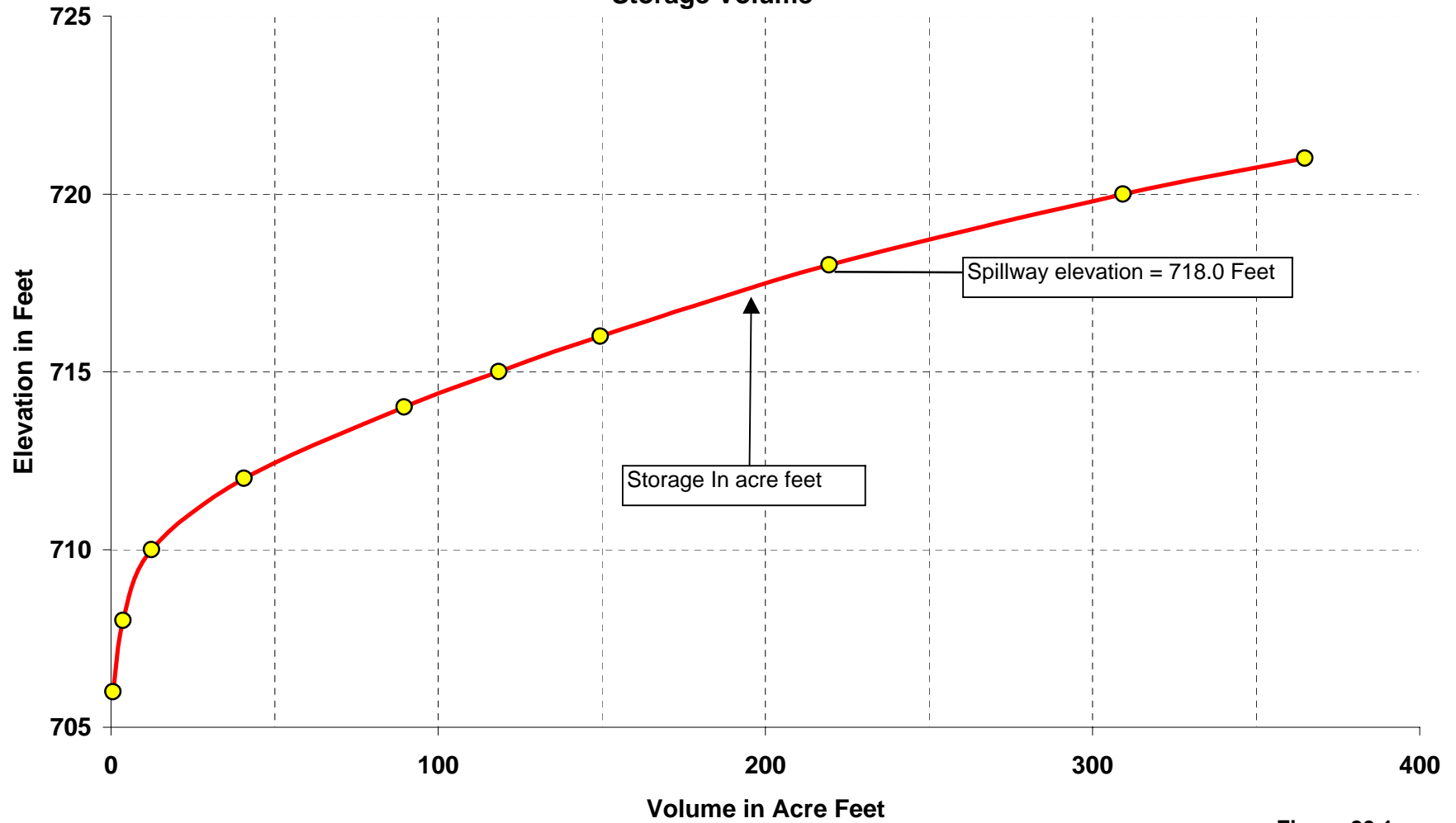


Figure 20.1.c

Memphis, Missouri

Water Supply Study

Old City Lake

Surface Area

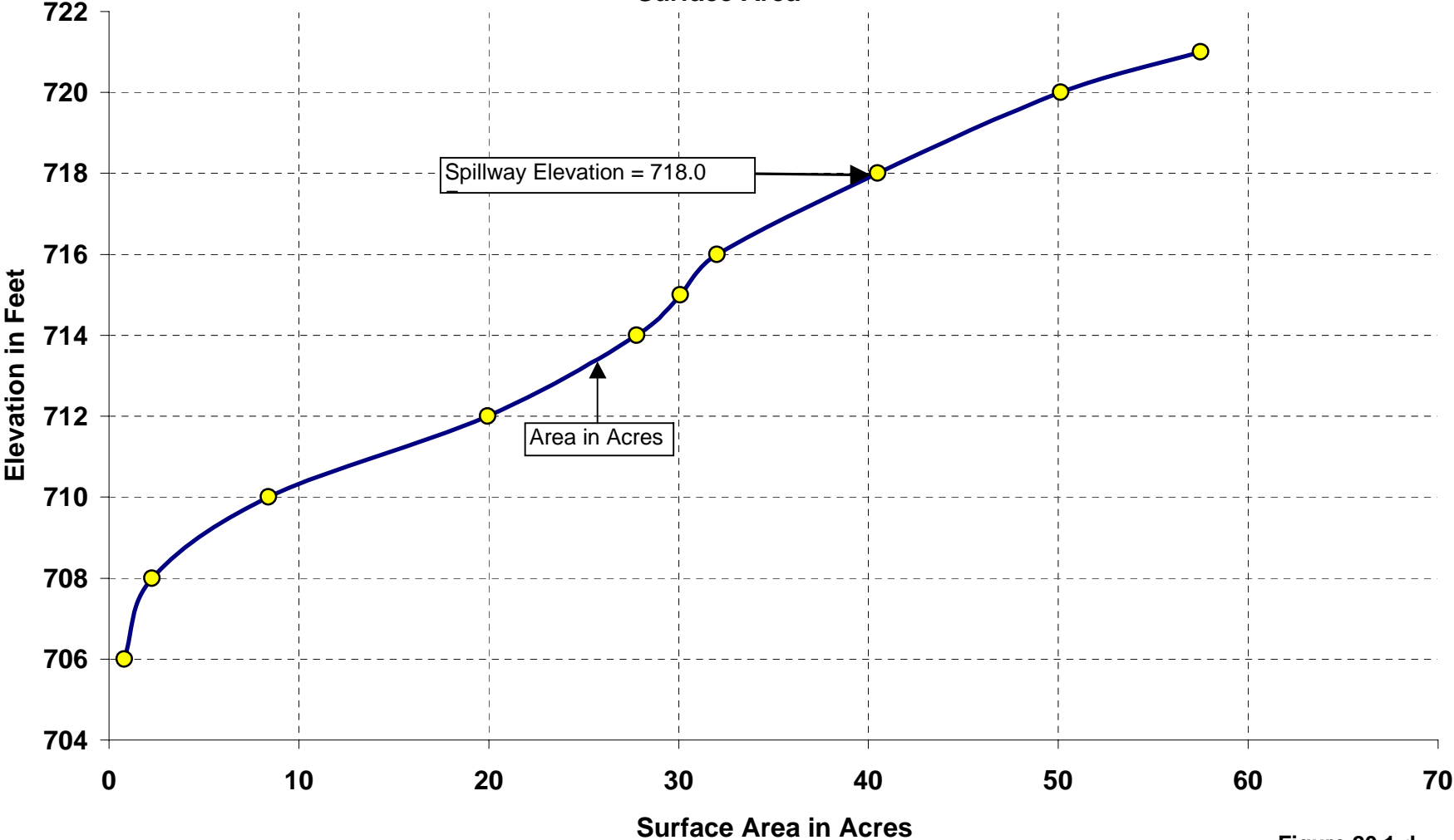


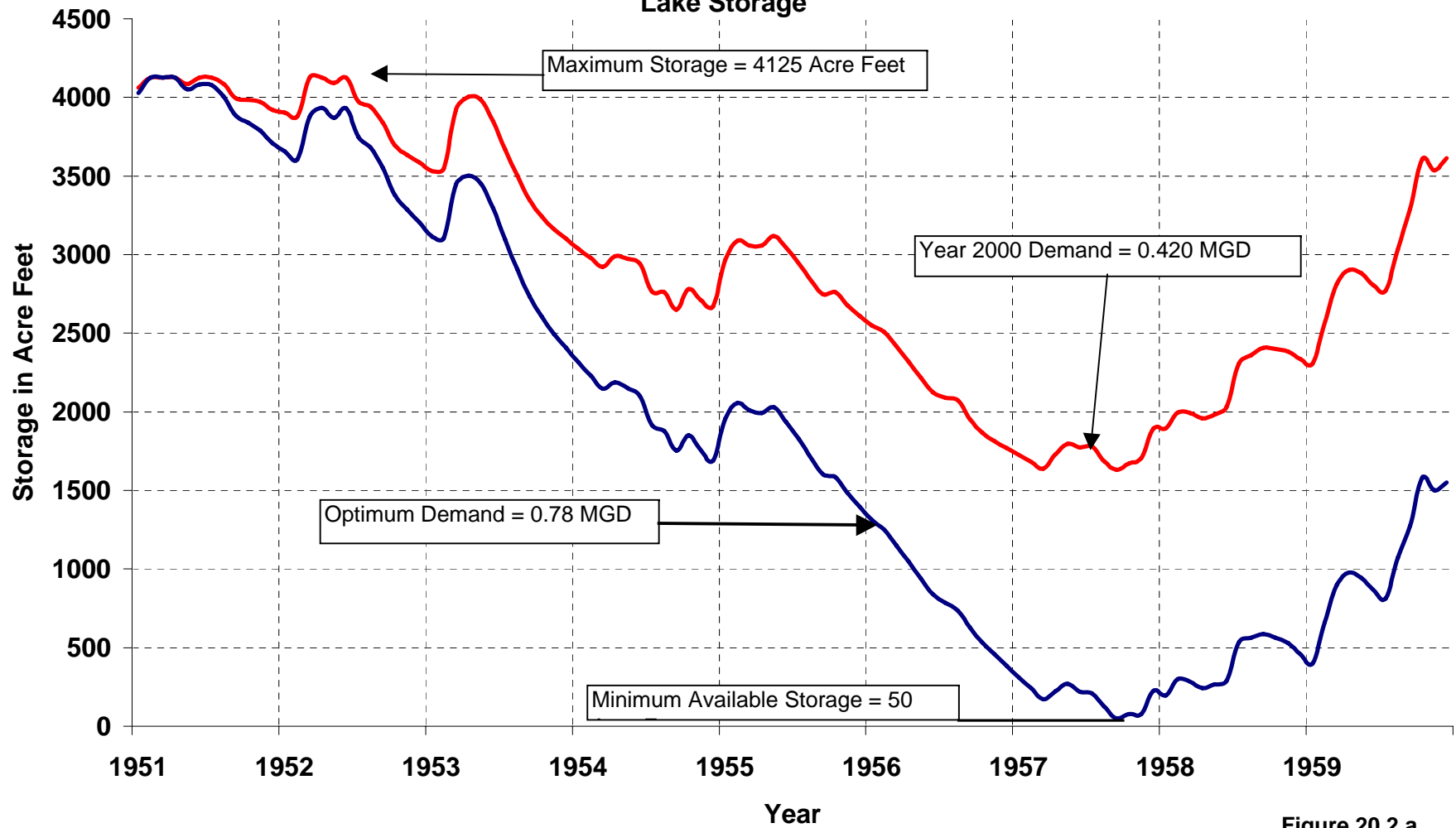
Figure 20.1.d

Memphis, Missouri

Water Supply Study

Lake Show Me

Lake Storage



Memphis, Missouri

Water Supply Supply

Old Memphis Lake

Lake Storage

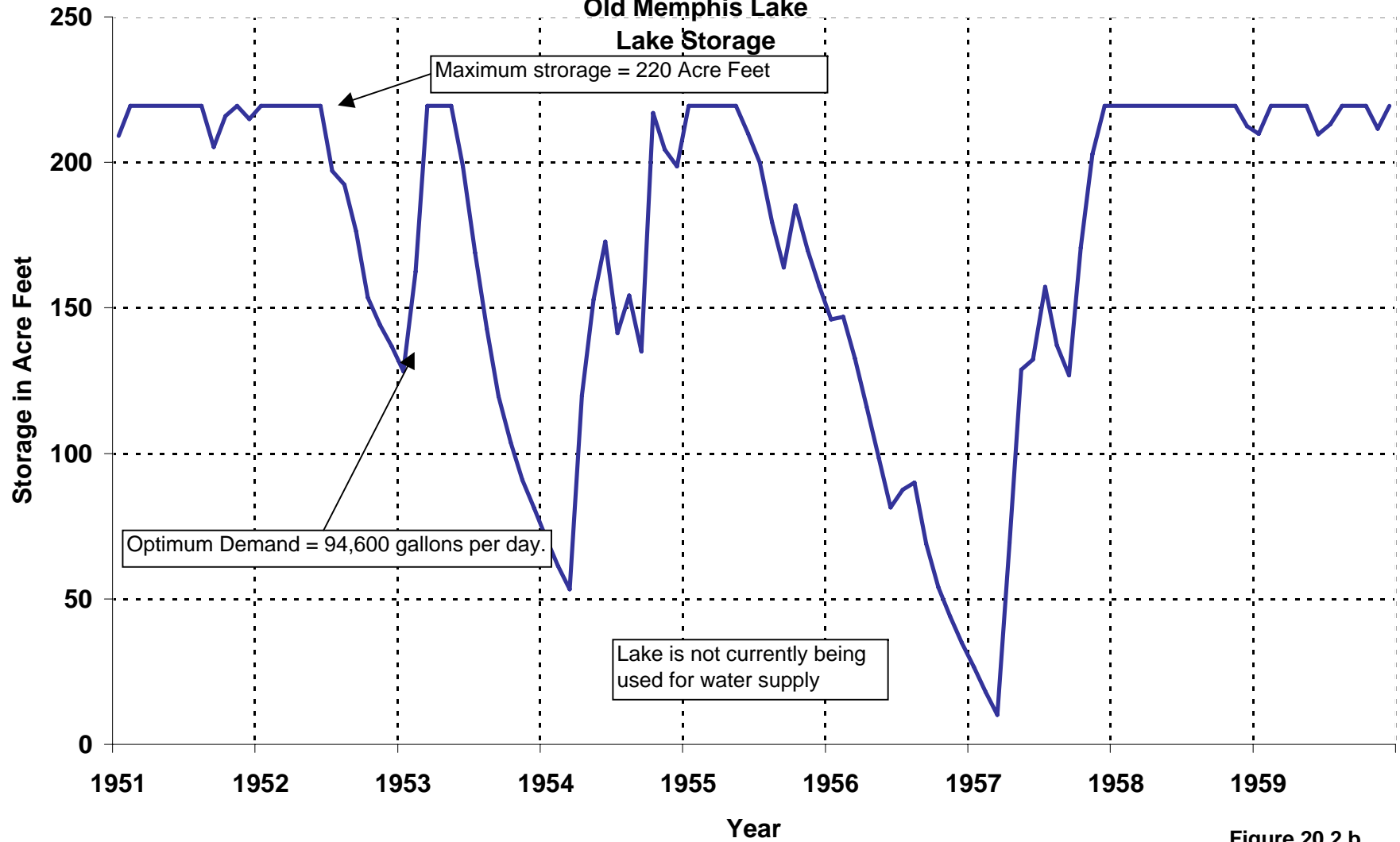


Figure 20.2.b

Memphis, Missouri
Water Supply Study
Water Use

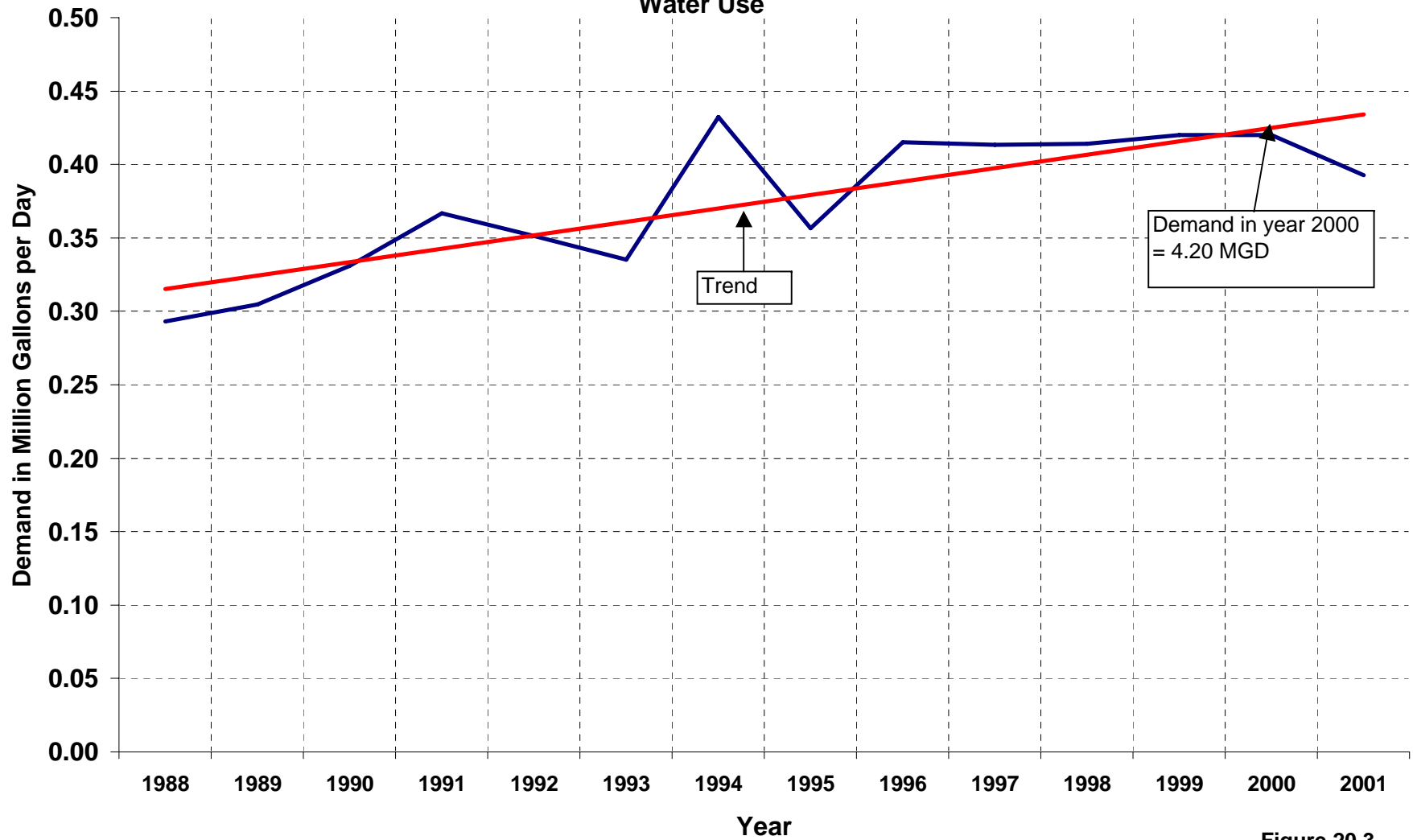


Figure 20.3

MEMPHIS (NEW) LAKE

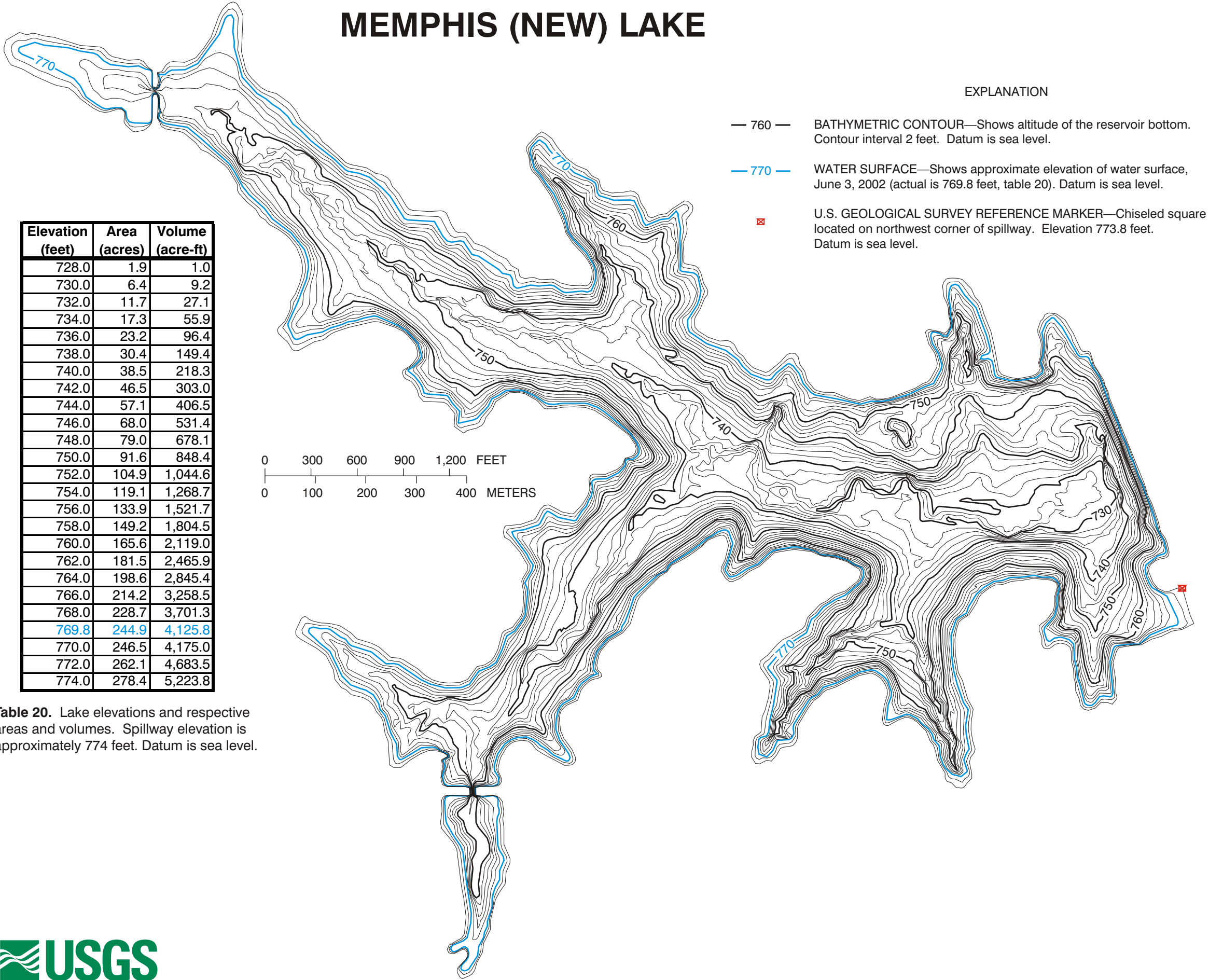


Table 20. Lake elevations and respective areas and volumes. Spillway elevation is approximately 774 feet. Datum is sea level.

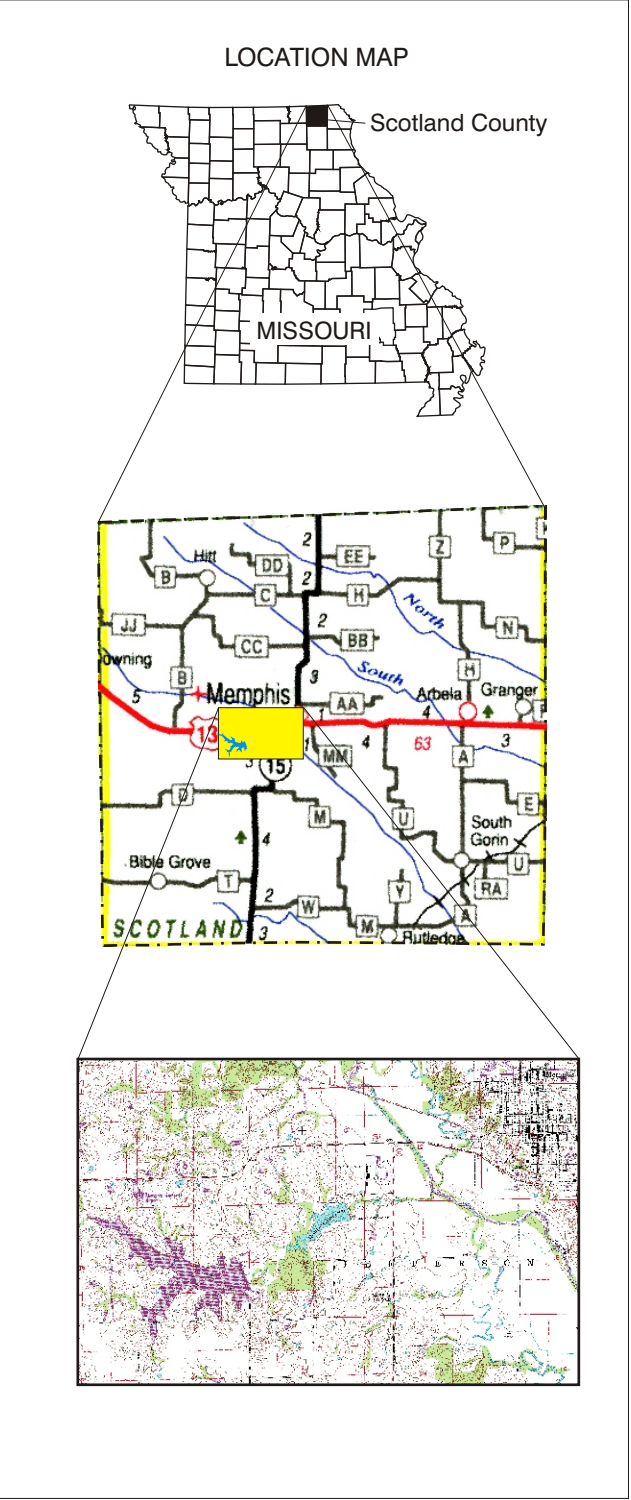
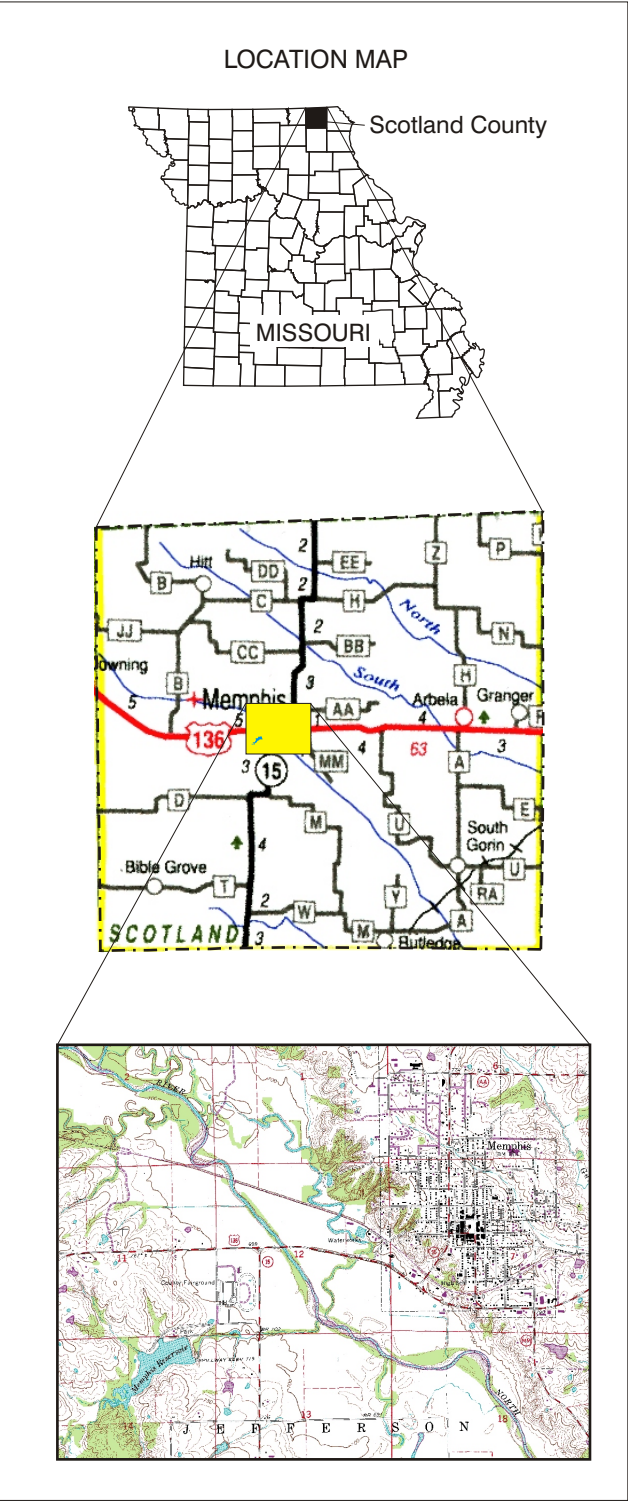
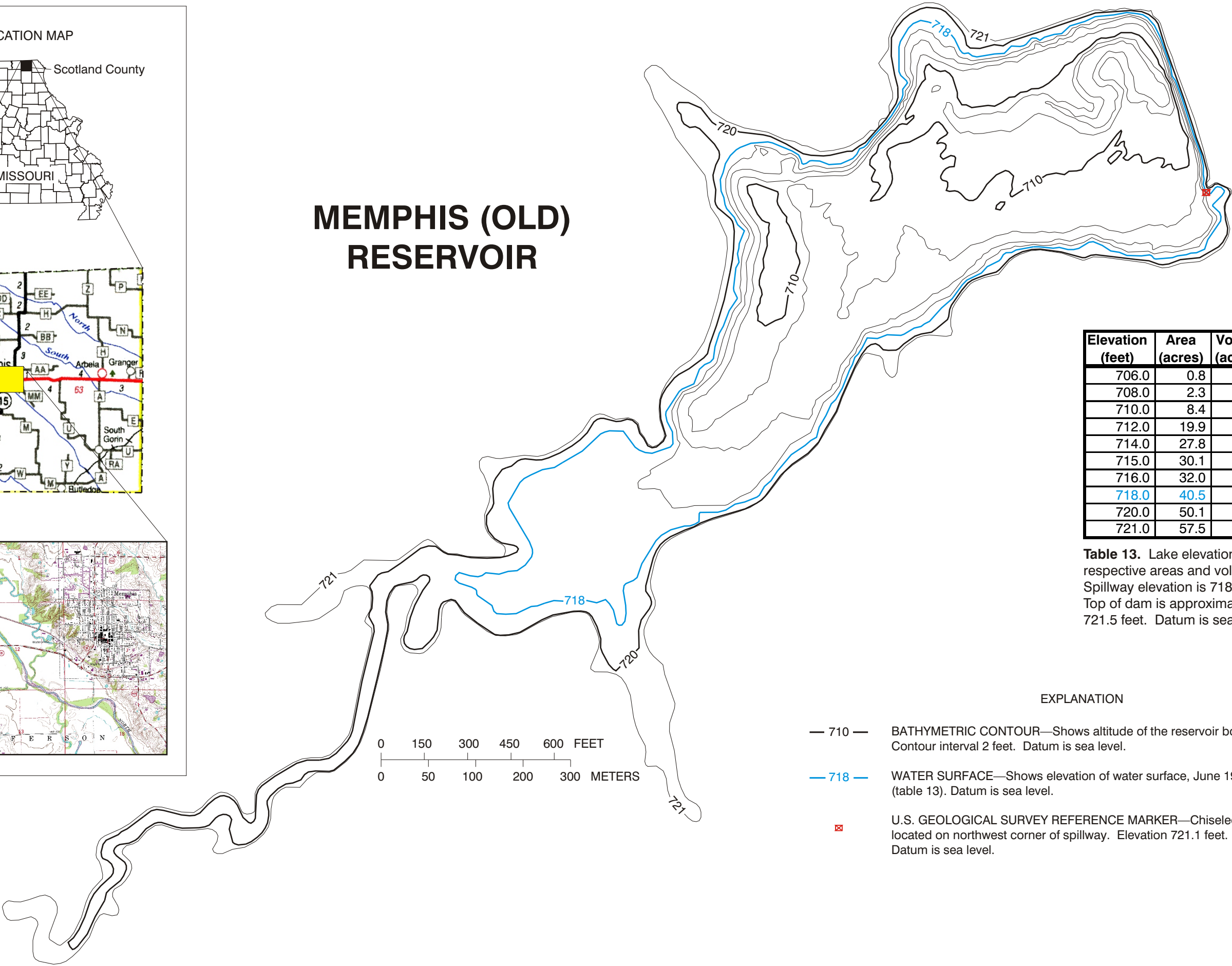


Figure 20.4.a Bathymetric map and table of areas/volumes of the New Memphis Lake near Memphis, Missouri.



MEMPHIS (OLD) RESERVOIR



Elevation (feet)	Area (acres)	Volume (acre-ft)
706.0	0.8	0.6
708.0	2.3	3.7
710.0	8.4	12.5
712.0	19.9	40.7
714.0	27.8	89.6
715.0	30.1	118.6
716.0	32.0	149.6
718.0	40.5	219.5
720.0	50.1	309.4
721.0	57.5	364.9

Table 13. Lake elevations and respective areas and volumes. Spillway elevation is 718.0 feet. Top of dam is approximately 721.5 feet. Datum is sea level.

EXPLANATION

- 710 — BATHYMETRIC CONTOUR—Shows altitude of the reservoir bottom. Contour interval 2 feet. Datum is sea level.
- 718 — WATER SURFACE—Shows elevation of water surface, June 19, 2001 (table 13). Datum is sea level.
- U.S. GEOLOGICAL SURVEY REFERENCE MARKER—Chiseled square located on northwest corner of spillway. Elevation 721.1 feet. Datum is sea level.

Figure 20.4.b. Bathymetric map and table of areas/volumes of the Old Memphis Reservoir near Memphis, Missouri.